Where:

G_S = Mass of carbon measured during the mode sampling period [g].

R_2 = The fuel carbon weight fraction, which is the mass of carbon in fuel per mass of fuel [g/g].

(j) The grams of carbon measured during the mode, G_S, can be calculated from the following equation:

$$G_S = \frac{(12.011 \cdot HC_{mass})}{(12.011 + 1.008 \cdot \alpha)} + 0.429 \cdot CO_{mass} + 0.273 \cdot CO_{2mass}$$

Where:

HC_{mass} = mass of hydrocarbon emissions for the mode sampling period [grams].

CO_{mass} mass of carbon monoxide emissions for the mode sample period [grams].

CO_{2mass} = mass of carbon dioxide emissions for the mode sample period [grams].

α = The atomic hydrogen-to-carbon ratio of the fuel.

[60 FR 34598, July 3, 1995, as amended at 70 FR 40450, July 13, 2005; 73 FR 59182, Oct. 8, 2008]

§ 90.427 Catalyst thermal stress resistance evaluation.

(a) The purpose of the evaluation procedure specified in this section is to determine the effect of thermal stress on catalyst conversion efficiency for Phase 1 engines. The thermal stress is imposed on the test catalyst by exposing it to quiescent heated air in an oven. The evaluation of the effect of such stress on catalyst performance is based on the resultant degradation of the efficiency with which the conversions of specific pollutants are promoted. The application of this evaluation procedure involves the several steps that are described in the following paragraphs.

(b) *Determination of initial conversion efficiency.* (1) A synthetic exhaust gas mixture having the composition specified in § 90.329 is heated to a temperature of 450 °C ±5 °C and passed through the new test catalyst or, optionally, a test catalyst that has been exposed to temperatures less than or equal to 500 °C for less than or equal to two hours, under flow conditions that are representative of anticipated in-use conditions.

(2) The concentration of each pollutant of interest, that is, hydrocarbons, carbon monoxide, or oxides of nitrogen, in the effluent of the catalyst is determined by means of the instrumentation that is specified for exhaust gas analysis in subpart D of this part.

(3) The conversion efficiency for each pollutant is determined by:

(i) Subtracting the effluent concentration from the initial concentration;

(ii) Dividing this result by the initial concentration; and

(iii) Multiplying this result by 100 percent.

(c) *Imposition of thermal stress.* (1) The catalyst is placed in an oven that has been pre-heated to 1000 °C and the temperature of the air in the oven is maintained at 1000 °C ±10 °C for six hours.

(2) The catalyst is removed from the oven and allowed to cool to room temperature.

(d) *Determination of final conversion efficiency.* The steps listed in paragraph (b) of this section are repeated.

(e) *Determination of conversion efficiency degradation.* (1) The final conversion efficiency determined in paragraph (c) of this section is subtracted from the initial conversion efficiency determined in paragraph (b) of this section.

(2) This result is divided by the initial conversion efficiency.

(3) This result is multiplied by 100 percent.

(f) *Determination of compliance with degradation limit.* The percent degradation determined in paragraph (e) of this section must not be greater than 20 percent.

[60 FR 34598, July 3, 1995, as amended at 64 FR 15244, Mar. 30, 1999]